

Republic of Benin

Ministère de la Santé Ministère de la Protection Sociale
Institut Régional Catholic Relief
Publique et de la Condition Féminine
de Santé Publique Services

BASELINE REPORT

Anthropometry Survey of Nutritional Status of Children 18 to 36 Months of Age in Mono Department (Rural Areas), Benin

Final Version

August 13, 1998

**Dr. Victoire AGUEH, IRSP
Dr. Marius OUENDO, IRSP
Dr. Emile AKOWANOU, CRS/Benin
Elisabeth ZANOU, CRS/Benin
Paul F. MACEK, CRS/Benin
Antoinette LAWIN-ORE, C/PAN**

Report written by:

**Dr. Victoire Agueh, IRSP
Dr. Emile Akowanou, CRS/Benin
Elisabeth Zanou, CRS/Benin
Paul F. Macek, CRS/Benin**

*Financing: BASICS Project of the
United States Agency for International Development*

Acknowledgments:

The authors of this report would like to thank the following persons for their contributions to the preparation and conduct of this survey:

- 1) Ministry of Public Health (MSPS),
- 2) Ministry of Social Protection and Women's Condition (MPSCF),
- 3) Departmental Director of Health, Mono Department,
- 4) Professor Pathé Diallo, Director, Institut Régional de Santé Publique,
- 5) Mr. Bart Burkhalter, BASICS Project,
- 6) Mr. Robert Davis, Catholic Relief Services,

- 7) All the survey Supervisors:

Dr Victoire AGUEH	Cyprien SOSSA	Pascal ADJILE
Dr Marius OUENDO	Edwige d' ALMEIDA	Marie AMOUSSOU
Antoinette LAWIN-ORE	Félix AMOUSSOU	Mélanie AKANDO
Augustin BODJRENOU	Paul MACEK	Elisabeth ZANOU
Emmanuel BOKOSSA		

- 8)The Surveyors:

AGBOIBA Zénabou	ADISSO Julienne	TOSSA Y. Jean
AKOUTA René	KOUEGAN Véronique	ADETONAH Justine
KASSA Louise	SAGBO Ludovic	KOULO Justine
KOUAKUVI Constance	DOSSOU-A Séraphine	MAKOUTODE Patrick
HODE Marie-Thérèse	KIKI Christine	BEAKOU Elie
HOUESSOU Florence	AWARAKA Jeanne	AGUEMON Agnès
GBAGUIDI Genevièvre	ZINSOU Zackarie	OUGODARE Boniface
HOUNKPATIN Côme Romain		

- 9) All the Sub Prefects of the Mono Department, traditional rulers, and Village Social Development Committees who welcomed the survey teams.

- 10) Survey Trainers:

Irwin Shorr, Consultant
Dr. Victoire Agueh, Professor, IRSP
Dr. Edgard-Marius Ouendo, Professor, IRSP

List of Acronyms

AC	<i>Animatrice Communautaire</i> - Community Health Promoter
BHR/FFP	Bureau for Humanitarian Response/Office of Food for Peace
CDC	Center for Disease Control
CPS	<i>Centre de Promotion Sociale</i> - Social Promotion Center
CS	Child Survival
CSSP	Child Survival Support Program attached to Johns Hopkins University
DAP	Detailed Activity Plan
DHS	Demographic Health Survey
DPP	Detailed Program Plan (Multi-year program plan), currently DAP
DPS	<i>Direction de la Protection Sociale</i> - Department of Social Protection
FACS	Food Assisted Child Survival Program
FNP	Food and Nutrition Program administered by Cellule PAN
EPI	Expanded Programme on Immunization
IGA	Income Generating Activity (small or micro enterprise).
KPC	Knowledge, Practice, (Vaccination) Coverage Survey developed by Johns Hopkins University
MCH	Maternal Child Health Program
MIS	Management Information System
MSP	<i>Ministère de la Santé Publique</i> - Ministry of Public Health
NGO	Non-governmental Organization
VSDC	Village Social Development Committee
WHO	World Health Organization

Table of Contents

EXECUTIVE SUMMARY	i
1. INTRODUCTION.....	1
1.1 Background.....	1
1.2 Objectives of the Survey.	3
1.3 Schedule of Activities in Benin.....	3
2. STUDY AREA.....	5
3. METHODOLOGY.....	6
3.1 Type of Study.....	6
3.2 Sampling Frame.....	6
3.3 Sample Size.....	7
3.4 Data Collection Tools.....	8
3.5 Training of Supervisors and Surveyors.....	9
3.6 Conduct of the Survey.....	12
3.7 Data Entry	12
3.8 Specific Information Used during the Survey	13
3.9 Method of Data Analysis and Discussion of the Results	13
4. RESULTS	14
5. DISCUSSION	23
5.1 Quality of Data Collected	23
5.2 Prevalence of Different Types of Malnutrition Observed in the Sample.....	24
5.3 Malnutrition Rates by Sex.....	26
5.4 Malnutrition Rates by Age Group	26
5.5 Comments on the Nutritional and Health Status of the Children	26
6. CONCLUSION.....	27
7. BIBLIOGRAPHY	28
8. ANNEXES	
ANNEX A Survey Questionnaire in French	
ANNEX B Sheets for Age Estimation and Determination of Stature (Measuring Position)	
ANNEX C List of selected communities for the survey	
ANNEX D Standardization Test Results	

EXECUTIVE SUMMARY

Since 1982, the Government of Benin in partnership with CRS/Benin has carried out a Maternal Child Health (MCH) Program whose principal objective has been the reduction of malnutrition rates for children aged 0 to 24 months of age. In the course of previous years, this program has undergone a number of programmatic revisions designed to improve the program strategy and measure impact on the poorest groups and those most at risk.

Despite encouraging results and continuous improvement in program activities, two principal constraints remained in 1995. On the one hand, it was necessary to implement an advanced strategy to:

- " improve targeting of beneficiaries so that the most needy are participating, and
- " ensure the sustainability of program activities such that the beneficiaries themselves progressively took over program management.

On the other hand, the donor community was unanimous in its need to have concrete results showing improved impact in order to justify the resources given to such programs worldwide. This required not only the identification of measurable indicators but also the development of new tools that are inexpensive enough to be useful to PVOs and accurate enough to show progress.

It was primarily for these two reasons that:

- " First, MSPSCF and CRS/Benin designed the community based Food Assisted Child Survival (FACS) Program to have the following objectives: a) improved targeting of food insecure zones, and b) the training of local populations to manage the program and seek solutions to their health problems.
- " Second, the two counterparts have decided to use the KPC survey as a principle means for collecting management and impact data about vaccination coverage and the health knowledge and practices of mothers in key child survival areas.

The community based Food Assisted Child Survival Program (FACS) is currently only being executed in the Ouémé and Mono Departments, whereas in the four other departments (administrative regions) the previous center-based program is still being conducted. CRS/Benin in partnership with the Ministry in charge of social affaires (currently the MSPCP) receives financial and material support from Title II and Farm Bill grants for a period of five years that began in Fiscal Year 1996. The support was given to help the MCH program make a progressive transition from a traditional, center based MCH program to a community based Child Survival program, in which approximately 49,500 monthly beneficiaries would receive growth monitoring and health education services as well as a small ration of food.

In order to collect baseline data, the MSPSC, IRSP, and CRS/Benin conducted a baseline anthropometry survey from 29 July to 8 August 1998, in a representative sample of 30 targeted communities of the Food Assisted Child Survival (FACS) program in the Mono Department. Funded by USAID/BASICS, this survey was conducted with the technical support IRSP and the Health and Nutrition Section of CRS/Benin. The following groups also collaborated on the survey: the Food and Nutrition Program Unit (Cellule/PAN) and the Direction of Social Protection.

The survey goals were:

- " to appreciate the distribution of the anthropometry indices¹ (height-age; weight-age; and weight-height) in children aged 18 to 36 months of age in a representative sample of the 86 rural FACS project communities of the Mono, and
- " to empower a group of qualified persons in Benin to be capable of conducting anthropometry surveys in the future.

The survey provides information which allows the determination of nutritional status in the target zone of the project during the first year of project activities. The survey objectives were completed in four weeks. CRS/Benin and IRSP held intense reflections about the survey results to evaluate the project activities and to assist CRS in writing the next Detailed Activity Plan.

The principle survey results shows that:

- " 41.8% of the children aged 18 to 36 months of age surveyed suffer from chronic malnutrition, indicated by stunting and 13.4% of the same children illustrate severe stunting. According to WHO classification, this malnutrition rate (41.8%) is very high.
- " 34.4% of children surveyed are underweight with 5.2% or 32 of the 620 children illustrating severe underweight. According to WHO classification, this malnutrition rate (34.4%) is very high.
- " Only 22 of the 620 children surveyed suffer from acute malnutrition illustrated by wasting of 3.5% of the population surveyed, which represents a low prevalence rate.

¹The measurements used in this survey are height, weight, and age. When these measurements are combined, we obtain the values for the different anthropometric indices which are height for age, weight for age, and weight for height. The indicators used in this study are moderate and severe malnutrition as define by standard deviation from mean for the reference population.

" The mean z-score for stunting is -1.73 and for underweight children, it is -1.56, whereas for wasting, the mean z-score is -0.63. The two first averages correspond to very high levels of chronic malnutrition and underweight.

1. INTRODUCTION

1.1 Background

CRS/Benin, a PVO with its headquarters in Baltimore, MD, has been implementing a national social sector program in Benin since 1958. This program has been jointly implemented with different ministries who, throughout the years, have been in charge of the agency for social affairs, CRS" principal counterpart. The project receives Title II resources from the American government through an AID grant from the Bureau for Humanitarian Response, Office of Food for Peace (BHR/FFP). The early basis for the program was to assist those at risk for food insecurity and its primary activity was the distribution of imported foods from the United States. The U.S. public law No. 480 outlines the conditions under which the such foods are distributed by the USAID, while the BHR/FFP concerns itself principally with logistical management of these foods.

Beginning in 1982, CRS/Benin decided, in consultation with its Beninese government counterpart, to use these resources to reinforce a social development program (**The Food and Nutrition Program**) instead of outright social assistance for which the impact was difficult to estimate. The national program, know as the Food and Nutrition Program (**PAN**), is being executed in 95 Mother Child Health Centers (MCH Centers) spread throughout Benin"s six departments. The large majority of these centers (77) are government run (**MOH-68 centers; Ministry of Rural Development-9 centers**) while the rest are either Church run (**15 Centers**) or managed by Community Organizations (**3 Centers**). These centers are essentially located in the administrative seat of the subprefectures. Thus, the target group for the program, namely, the poorest populations, often have to travel long distances to take advantage of the services offered by the social centers.

Nevertheless, approximately 49,500 children aged 0 to 24 months, participate on a regular monthly basis in the program"s activities of growth monitoring and follow up of the vaccination schedule. The program also conducts health information, education, and communication (IEC) sessions for the children"s mothers before the growth monitoring sessions. To provide incentive for the mothers to come regularly, a Title II food ration accompanies the growth monitoring and education activities. In addition, CRS/Benin has initiated over the years a project of **income generating activities** (IGA) for the mothers who wish to start a small commerce activity or micro enterprise.

Despite the positive results of the previous center based Maternal and Child Health program, past evaluations in 1993 and 1995 have shown the following insufficiencies:

- " National program coverage remains low (around 7 % of the target population).
- " The manner in which persons are selected for the program does not necessarily guarantee

that the true target population is being reached. Given the location of existing centers, it is not surprising to find that the many of the mothers come from urban and semi urban areas.

- " Community involvement in the management of the program remains low.
- " Malnutrition rates for children between 0 and 2 years of age has not significantly decreased from an average of 35% despite the many years in which the program has existed.
- " Many of the messages used to educate and sensitize the mothers following the growth monitoring sessions are not put into practice in the households. Reasons for this include difficulty in purchasing necessary foods and lack of education of other family members who care for the children. In this respect, existing efforts to address the lack of household income have not been sufficient to address the magnitude of such problems.
- " The association and support of other family members (husbands, aunts, grandmothers, and older children) besides the mothers themselves, is lacking and insufficient. They are often opposed to changes made by the mother, who is the only member of the household educated at the MCH centers. The support of other family members would encourage the mothers to implement important practices in the household.

Given these insufficiencies, a community based Food Assisted Child Survival (FACS) Program has been chosen as the new, preferred strategy. This approach provides an integrated health program that targets specific communities, instead of individuals, and seeks to reinforce community capacity to solve their own health problems. With a well elaborated program of activities, sufficient resources, and education messages targeted to the needs of each community according to the strengths and weaknesses revealed by the KPC, the FACS program will be able to surmount the aforementioned insufficiencies of the old center based MCH program.

For the new strategy to succeed, it is critical to identify a number of measurable progress indicators at different periods during the project life of activity. The current survey complements the KPC Survey conducted in April 1998 by providing precise information about nutritional status. The KPC provides information about practices and knowledge, which can influence nutritional status. The standard anthropometry survey is based on three principle indices:

- " Height for age,
- " Weight for age, and
- " Weight for height.

In 1991, USAID recommended that all PVOs with new FHA/PVC Child Survival grants conduct

a 30 cluster baseline KPC survey using a standardized questionnaire developed by JHU. This questionnaire was developed to collect information about mothers' child survival knowledge and practices. Later in 1997, BHR/FFP began requiring that all MCH programs report anthropometric measures of nutritional status.

In order to meet these requirements, a team of trainers consisting of Mr. Irwin Shorr, Dr. Victoire Agueh, Dr. Marius Ouendo, Ms. Elisabeth Zanou and Mr. Paul Macek trained surveyors and supervisors in regard to the objectives of the survey, its organization and the contents of the questionnaire.

1.2 Objectives of the Survey

The primary objectives of the survey are to provide MSPSCF and CRS/Benin with information about the following:

- " the distribution of the indices "height for age", "weight for age", and "weight for height" in children 18-36 months old in a representative sample of the 86 Mono FACS program communities,
- " nutritional status of children in order to assist in measuring the impact of the FACS program on children aged 18-36 months.

At the end of the survey, the Ministry of Social Protection and Women's Condition (MSPCF) and Catholic Relief Services will have the following information on the status of malnutrition in the Mono Department:

- " the percent of children showing moderate or severe stunting,
- " the percent of children suffering from moderate or severe underweight, and
- " the percent of children suffering from moderate or severe wasting.

1.3. Schedule of Activities in Benin

1.3.1 8 July 1998

- " Discussion of survey objectives, duration of study, identification of core team members, survey coordinators, supervisors and surveyors.
- " Survey site choice
- " Division of tasks

1.3.2 14 July 1998

- " Develop calendar of events for study
- " Discuss each member"s role in the study

1.3.3 23 July 1998

- " In-depth planning of surveyors and supervisors" training sessions
- " Discuss technical, pedagogical and logistical materials to be used in training sessions

1.3.4 29 July 1998

- " Training followed by an evaluation of the surveyors and supervisor skills using standardization testing in Lokossa, Mono Department
- " Organization of the teams and travel to the survey sites

1.3.5 8 August 1998

- " Data collection in the survey communities selected in the Mono Department

1.3.6 13 -17 August 1998

- " Verification of questionnaires completed by clusters
- " Double data entry in Epi Info
- " Elaboration of the analysis plan
- " Data analysis

1.3.5 18-22 August 1998

- " Follow up of data analysis
- " Begin report writing

1.3.8 24-28 August 1998

- " Final report given to CRS/Benin by IRSP

2. STUDY AREA

The study took place in the 30 communities of the 86 FACS project communities of the Mono Department, which is situated in south eastern Benin. This department covers a surface area of 4.009 km.² and is bordered to the north by the Zou Department, to the south by the Atlantic Ocean, to the east by the Republic of Togo, and to the west by the Atlantic Department. In 1997 the population of the Mono was estimated at 793,202 inhabitants by the INSAE. The main activities of the residents of the Mono Department are agriculture, fishing, and commerce. The climate is sub-equatorial with two dry seasons and two rainy seasons.

3. METHODOLOGY

3.1. Type of Study

This anthropometric survey is essentially a descriptive, quantitative study during which data was collected through simple observation. The study focused on children 18 to 36 months in age in the Mono Department who were weighed and measured for height. Their age was determined from date of birth if records were available or otherwise, by estimation.

3.2. Sampling Frame

3.2.1. Estimation of the Parameters of the Population from the Sample

In order to obtain complete information about the different measurements--weight and height--of children aged 18 to 36 months which is the target population for the survey, the ideal strategy would be to visit each household with a child in the target age group in each of the 86 FACS project communities of the Mono Department. We would have obtained the parameters for the distribution of weight and height in the whole project area. These parameters are: the average, the mean, and the standard deviation (z-score). Unfortunately, it is neither possible nor practical to visit each household. Since we are selecting a sample to describe the entire group, we can estimate the parameters for the sample size which interest us and describe the level of confidence of our estimates for the whole population. To do this, we performed random selections at each level -- community, village, household, etc.

3.2.2. Household and Child Selection

Children aged 18 to 36 months constitute the primary sampling unit of the survey. The best technique for selecting such children would be to perform a simple random selection which would consist of making a list of all the children in all 86 project communities aged 18 to 36 months, assigning a number to each child, and putting all the numbers in a receptacle and randomly drawing numbers until the desired number for the sample size is reached. The survey would then be administered to the children selected. However, it is not possible to obtain a list of all the children of the target age in the FACS project communities. We have therefore chosen a stratified sampling method using a cluster selection with multiple steps. Each cluster represents a community. In the FACS program, a community can be considered a hamlet, a village, or a grouping of villages.

3.2.2.1. First Step

During this stage, the communities which make up the sample were chosen using a systematic method which was self-weighting according to population size. First, the survey team drew up a list of each of the 86 FACS communities with their population size and cumulative population for the entire group. From this list and using a random number taken from a currency note, the first

cluster was randomly selected. Each of the consecutive clusters was chosen using the sampling interval obtained by dividing the total cumulative population by 30 and adding the sampling interval to the original randomly selected number from the currency note. This process was originally performed for the KPC Survey conducted in April 1998, the same 30 clusters also served as the clusters for the Anthropometry Survey.

3.2.2.2. Second Step

This step allowed the survey team to select the households to survey. As soon as the teams arrived in a community, the team leader and supervisor were responsible for the random selection of the initial household and survey direction. The team would meet with the village chief or mayor and some of the members of the village development committee members to draw up a list of neighborhoods, hamlets or villages of relatively equal population size within the community. One or more of the localities is then randomly drawn. The supervisor then proceeded to the center of the first randomly selected locality and randomly select a direction by spinning a bottle or pen on the ground. S/he numbered all consecutive houses along an the imaginary line indicated by the bottle or pen and then randomly selected one of the various houses to begin the survey. Selection of the second and all consecutive houses within the cluster is done on the basis of the house whose door has the closest proximity to the first house. Since we can be assured that the first house and direction were randomly selected, then we can be assured that all subsequent houses will be selected randomly. Thus, the surveyors proceeded by going from house to house until the 20 questionnaires per cluster were completed. In a number of cases, surveyors made appointments to return to the house if the mother or her child"s health documents were not available.

3.3. Sample Size

It is important to have a sample size that allows us to obtain a good estimation of the various statistical parameters (mean, median, standard deviations for weight and age) which interest us and to determine the margin of error with respect to the real values of the parameters within the study population. It is equally important to have a representative sample. The random selection with the cluster method guarantees representativeness. The precision is tied to the size of the sample: the larger the sample, the higher the precision.

By using a parameter estimation and by choosing a level of desired precision, we can calculate the minimum necessary sample size. For a survey such as ours, the minimum sample size is given by the following formula:

$$n = z^2c(pq)/d^2$$

where **n** represents the minimum sample size;

z is determined by the desired statistical certainty;

c is the cluster effect which often has a value between 1.5 and 2.0;

p is the prevalence or coverage rate/level to be investigated; however, **p** is most often determined by the coverage rate that requires the largest sample size (**p** = 0.5). This happens when the product of **p x q** has the largest possible value for the given values of **z** and **d**. For this reason, **p** is often equal to 0.5.

q = 1 - **p**; and

d = precision desired.

The value of **d** depends on the precision, or margin of error, desired. For example if **d** = 0.05 (i.e., if we allow ourselves a 5% error), the statistical certainty chosen would be 95%. Most often, in a study such as ours, the chosen statistical certainty is 95%, which give the corresponding value of 1.96 for **z**. The value is taken from a statistical table which corresponds to a population with a normal distribution. Given the above values for **z**, **p**, **q** and **d** and assuming a cluster of effect of **c** equal to 1.5, the following sample size (**n**) needed was determined to be:

$$n = \frac{(1.96 \times 1.96)(1.5)(0.5 \times 0.5)}{(0.05 \times 0.05)} = \frac{(3.84)(0.25)}{(0.0025)} = 576$$

The number of clusters is not fixed, however, there are a number of theoretical reasons which suggest using at least 30 clusters and to equally distribute the final sample among the 30 clusters (Henderson, et. al., 1982).

By dividing the number 576 for the sample size by 30 clusters, we obtain the number 19.2 children per cluster which has been rounded up to 20 children for fear of losing precision. This gives us final sample of n=600 children . These 600 children are equally divided up among the 30 clusters with 20 children aged 18 to 36 months each.

This sample size allows us to have more precision and to make comparisons among sub-groups within the sample (boys, girls, age groups, etc.), with a precision of at least 95%.

3.4. Data Collection Tools

Three types of data collection tools were used:

- " a survey questionnaire,
- " a Shorr height measuring board, and
- " a hanging spring-dial scale (Salter type).

3.4.1. The Questionnaire

The questionnaire contained 11 questions selected by IRSP and CRS to assure the proper collection of information regarding the child's age, her standing height or recumbent length, and

her weight (see Annex A). The first two questions are addressed to the mother or child's caretaker. They collect information such as the name of the child and mother in order allow the survey team to quickly recover the mother in question should the supervisor discover that additional information is needed or that the survey is incomplete.

The third question collects information about the child's sex since the reference population was established according to gender.

Questions 4, 5, and 6 collect information about the child's exact age or estimated age the day the measurements are taken in order to determine the stature or position for taking the height measurement. Similarly, the reference population is designed to allow exact comparisons according to age in days. When a child is less than 24 months of age, his height is measured in a recumbent position; whereas when a child is 24 months or older, his height is taking in a standing position.

Question 7 allows us to collect information about the manner in which the child's birth date was verified.

Questions 8 and 9 allow spaces for the recording of recumbent length or standing height and weight.

Questions 10 and 11 require information about the quality of the measures taken and difficulties encountered by the surveyors and supervisors.

The **comment** section provides space for surveyors and supervisors to write down additional observations made during the data collection.

3.4.2. Shorr Measuring Boards and Scale

Each team (two surveyors and one supervisor) was equipped with one Shorr measuring board and one hanging spring dial scale (CMS model) in order to measure standing height or recumbent length and weight.

3.5. Training of Supervisors and Surveyors

3.5.1. Principal Objective

The principal objective of the training was to train the participants to take anthropometric measurements with precision and accuracy in children 18 to 36 months of age.

3.5.2. Training Objectives

At the end of the training the participants must be able to:

- " explain the importance of the following anthropometric infant indices: height/age, weight/age, and weight/height,
- " describe the instruments used to measure (scale and height measuring board),
- " measure with precision the weight and height in infants 18 to 36 months of age,
- " explain the importance of taking anthropometric measures with precision,
- " take measures to minimize the errors and bias that may arise, and
- " detect errors and identify their sources.

3.5.3. Before the Training

The training objectives, pedagogical methods, and the schedule of activities are those that were elaborated in 1997 for the anthropometry survey of the Ouémé Department. They were adapted for the Mono survey by the survey team composed of professionals from IRSP, CRS/Benin and the FNP Unit.

The training document used during the training was the same document written by Mr. Irwin Shorr and translated into French from English for the Ouémé Anthropometry Survey. The survey questionnaire and the supervision checklist were also the same as those developed in 1997 for the Ouémé Survey. The sheet used for determining the measuring position for the child and the age estimation sheet were updated by the survey coordination team for the Mono Survey.

3.5.4. During the Training

The training took place from 29 July to 4 August 1998 at ENI (Ecole Normale Intégrée) in Lokossa in the Mono Department. The training session lasted five days and was conducted by two professionals from IRSP assisted by other members of the coordination team. An American consultant hired by CRS, Mr. Irwin Shorr, was brought in to assist the training team.

In all, 22 surveyors and 11 supervisors from CRS, IRSP, DPS/Mono, CARDER/Mono, and from the Social Promotion Centers (CPS) of the Mono were trained. One observer, Dr. Kohossi Léon, from the NGO Africare also participated in the training session.

The training was concerned principally with two types of measures--weight and height--and particular attention was given to the following elements:

- Basic understanding of anthropometric indexes and indicators
- The use of measuring instruments,

- Correct measurement reading,
- Correct recording of measurements,
- Different measurement positions for height according to age,
- Filling out the questionnaire, and
- Age estimation techniques in the absence of written documents.

Beginning on the second day of training, practical exercises were organized in two villages situated approximately 30 km. from Lokossa which allowed the surveyors and the supervisors to practice measuring weight and height with precision and accuracy on children according to what was taught. These practical exercises allowed the participants to practice operating the measuring instruments and reading and recording measurements.

During the afternoons, special training sessions were given to supervisors on the characteristics of anthropometry surveys and on the role they should play in the survey teams. These responsibilities can be summarized as follows:

- selection of the first home,
- supervision of the surveyors during age determination and during the taking, reading and recording of measurements in order to ensure quality and precision,
- validation of the questionnaire, and
- resolution of problems as they appear.

During the fourth day of the training, a standardization test was organized in the primary school classrooms in the village of Medehounta. This test enabled the trainers to assess the participants skills with regard to precision and accuracy in measuring height and weight. "Precision" is the ability to repeat the same measurement on the same subject independently with little variation. "Accuracy" is the ability to obtain measurements that are closest to the real measurement.

Analysis of the results showed that most participants had inferior height measurements to those of anthropometry specialist, Irwin Shorr. The main cause was found to be not positioning the child's knees correctly while measuring in the standing position. The degree of accuracy in weight measurements was, on the whole, very good. The standardization test also allowed us to point out specific reading and recording errors.

Extra practice sessions were organized during the afternoon following the standardization test and on the following day so that the participants could improve their measuring techniques and thus guarantee good data collection during the survey.

For the standardization test, the participants were separated into 3 groups of 10 members each working with 10 children per group. Each participant measured each child twice for standing height, the hardest measurement to take, and weight. Measures were taken independently so that participants could not recall their first height measurement before doing the second. Both weight and height measurements were done independently of each other.

Accuracy in the analysis of the results requires that the measurements obtained be compared to the "real measurements," which are those done on each child by Mr. Irwin Shorr. Each participant's first and second measurements are then compared in relation to each other and to Shorr's. The results of the standardization test can be found in annex D of this report.

3.6. Conduct of the Survey

The survey was conducted over three consecutive days from August 5-8, 1998 in thirty clusters that took part in the April 1998 KPC survey in the Mono Department. Twenty-two surveyors and eleven supervisors were separated into eleven teams of three people each consisting of two surveyors and one supervisor. The data collection was coordinated by the survey team.

When a survey team arrives in a household and after greeting the members, the team explains the survey goals to the head of the household and/or women before identifying any children between the ages of 18 and 36 months who will be weighed and measured. If these children exist in the household, the team then asks to see birth or other documents recording a precise date of birth. If she answers "no", the team uses the age estimation sheet attached in annex B. The age and identification sections of the questionnaire are filled out before continuing on to the actual measurements of the child. The team proceeds in this manner until at least 20 children have been measured in each cluster.

If, for one reason or another, correct measurements were not taken or other problems presented themselves during the measurement process, an extra child 18-36 months was measured to replace the previous. This explains a number in excess of 20 children measured in certain clusters.

Each supervisor stayed with his team until the end of the survey. All of the completed questionnaires were verified at the survey site before leaving.

3.7. Data Entry

After the survey, an IRSP team checked the number and contents of questionnaires by cluster. In each cluster, the questionnaires were numbered 1 to 20 or more, according to the number of children surveyed.

The data entry was done twice by two data entry specialists working independently and

simultaneously on two different computers using EPI-INFO, one beginning with the 30th cluster, the other with the 1st. Data entry took place from 12-14 August, 1998 under IRSP supervision.

3.8. Special Information Used during the Survey

In certain cases, it is very difficult to determine exact ages for many individuals and especially for children who do not have birth certificates or other documents. This is particularly true in rural areas of Benin where birth registration is not common and where the exact birth date is rarely written in official documents.

To reduce the importance of age misreporting, we developed a table to indicate the limits for children aged 18 to 36 months (see annex B). Another table was also developed to help identify the proper measuring position according to birth date. In this table two age groups were identified--children 18 to 23.9 months of age and children 24 to 35.9 months of age. When a child's estimated age is close to two years, surveyors were trained to probe for information, such as local events, that would allow them to properly situate the child's "real" age in order to determine the correct measuring position (see annex B).

3.9. Method of Analysis and Discussion of the Results in Groups.

The data was analyzed on the software EPINUT in Epi Info. The tabulation of z-scores and their corresponding graphic representations provided information on nutritional status by sex and age group.

The discussion of results compares the Mono Survey results to those of the reference population data from the NCHS, the Ouémé anthropometry survey results, and 1996 DHS results for Benin.

4. RESULTS

At the end of the survey, a total 623 children had been surveyed. During the tabulation, three questionnaires were eliminated for the following reasons: one father refused to have his child measured due to the child's refusal; one child was not within the survey's age range; and one child refused to be measured.

Of the final 620 children surveyed, 299 (48.2%) were boys and 321 (51.8%) were girls.

The survey took place from August 5 to August 8, 1998. 208 questionnaires were completed on the 5th, 224 on the 6th, 187 on the 7th, and one on the 8th.

The average age of the children surveyed was 26.8 months \pm 5.04 standard deviations. As table 1 on page 17 illustrates, of the 620 children surveyed, 190 are within the 18 to 24 month age range, 231 in the 24 to 30 month age range, and 193 in the 30 to 36 month age group.

Of the 620 children surveyed, the exact birth date was verified using a card or birth book for 318 children (58.3%), according to birth certificates for 9 children (1.5%), using individual growth monitoring cards for 13 children (2.1%) and other documents for 5 children (0.8%). The ages of 275 children (44.4%) were determined with an age estimation table. In several cases, the exact birth date of the child was determined by referring to the documents of other children born in the same community.

Height was taken on 195 children in a recumbent position (31.5%) and on 425 children in a standing position. The number of children whose height was measured in the standing position is triple the number of children less than 24 months of age measured in a recumbent position which was 192.

In other words, the number of children for which height was taken in the standing position is 425, whereas the number of children in the 24 to 36 month age range is 428. This is explained by the fact that for four children over the age of 24 months, height was taken in the recumbent position since at the time of the survey these children had not started walking yet. On the other hand, one child less than 24 months of age was measured in a standing position.

The height for the 299 boys varied from 65.0 cm to 102.7 cm with an average of 82.1 cm and a standard deviation of 4.682. For the 321 girls, height varies from 68.2 cm to 96.4 cm with an average of 81.5 cm and standard deviation of 4.452. For the both sexes, the average height was 81.8 cm with a standard deviation of 4.571.

The weight for the 299 boys varied from 6.5 kg to 17.6 kg with an average of 10.9 kg and a standard deviation of 1.498. For the 321 girls, weight varies from 6.7 kg. to 15.4 kg. with an average of 10.5 kg and standard deviation of 1.398. For the 620 surveyed, the average weight was 10.7 kg. with a standard deviation of 1.461.

During the survey, all 620 children surveyed were naked or wore light clothes and none wore heavy clothing or braids which could have interfered with height measurement.

The 620 questionnaires were completely filled out. And for reasons already cited, three questionnaires were eliminated and therefore not analyzed during tabulation.

As far as the comments section of the questionnaire is concerned, 77.6% of the questionnaires contained no comments, 16% included comments that were not important to the analysis and frequently in relation to the child's behavior during the measuring (such as "child nervous," "child very agitated," "child cried," or "child very calm"), and additional information about age estimation (such as "child's age estimated using a health book or in relation to another known, verified birth," "in relation to local festivals or political events," or "in relation to the dates for deceased family members").

For 6.5% of the questionnaires, comments were very important and concerned children's physical deformities, their development of motor skills, and presence of clinical signs of severe malnutrition. Two children illustrated signs of kwashiorkor, three were noticeably underweight, two twins were visibly small and underweight for their age; one child at the age of 22 months had not begun walking or talking, four children older than 24 months of age did not walk, and one child had a fontanel which had not yet closed at the age of 19 months.

Other comments provided additional information which helped explain the nutritional status of the child: one child was orphaned from his mother three months following the birth and another child was abandoned by his mother at the age of one month.

Certain comments concerning the reasons for exclusion from final tabulation have already been mentioned. The majority of the comments concerned the remeasuring of children when initial measures seemed too low.

Before describing the measures or indices of childhood nutritional status used in this study, it is necessary to present the manner in which the indices are interpreted in order to determine the nutritional status of children. In accordance with recommendations given by the World Health Organisation (WHO), the estimation of nutritional status is done by comparing children of a given location to an international reference population. This reference has been established by the National Center for Health Statistics (NCHS), the Center for Disease Control and Prevention (CDC) and the World Health Organization (WHO) according to healthy American children under the age of five. The data from the international reference population are comparable for children in this age group in that whatever the population characteristics, all children follow a similar growth model from ages 0 to 5 years (DHS-Benin, 1996). The analysis most frequently used compares the study population to reference population and tabulates the number of children who fall below -2 and -3 standard deviations of the mean for the reference population. Another analysis is to present the mean z-score for the study population. Z-score is simply the standard deviation for each child surveyed compared to the mean for the reference population. In any

population, other comparisons² can also be made; however, we have chosen not to present them here.

Among the most frequently used methods to describe the nutritional status of children are three existing ones based on anthropometric methods (measuring height and weight of a child), namely, *height for age*, *weight for height*, and *weight for age*. Each measure has its own usage and interpretation that will be briefly presented here.³

The height for age is an index of chronic malnutrition and a lack of growth. The index height for age does not vary much according to seasons since a child cannot "lose" height. This index measures the long term effects of inadequate nutrition or chronic, repeated illnesses. Children whose height for age falls below negative two standard deviation exhibit slow growth and those with a height for age under negative three standard deviation exhibit severe growth problems. It is worth noting that after the age of two, height for age varies little.

The index of weight for height reflects the actual nutritional situation of the child, and, therefore, could vary greatly from one season to the next if, for example, there are certain seasonal nutritional deficiencies or if the child has recently been ill. A child who does not weigh enough for his height suffers from emaciation or is too thin. A child whose weight for height is below negative two standard deviation suffers from emaciation. And, the child whose weight for height is under negative three standard deviation is severely emaciated.

The index weight for age is a combination of the two indices already presented above. For example, it is difficult to distinguish if a child is in this situation because his height is too short for his age or because his weight is too low for his height. In any case, this index is highly recommended since it is often used in growth monitoring programs to assist mothers in following the growth of their children. A child whose weight for age is below negative two standard deviations of the mean for the reference population is underweight and a child whose weight for age is below negative three standard deviations of the reference population's mean suffers from severe underweight.

Tables 1 to 10 on pages 17 to 21 present the prevalence of moderate and severe stunting, underweight, and wasting as revealed by the survey by sex and by age group (18 to 23.9 months, 24 to 29.9 months, and 30 to 35.9 months). These prevalence were calculated using z-scores for the indices--height for age, weight for age, and weight for height. The final tables present the mean z-scores for each index by sex and age group.

²Such as percent of median or percentile analysis.

³Our discussion largely follows that found in the 1996 DHS for Benin, page 150.

TABLE 1 :Children Measured According to Age Group and Sex

Age Group (in months)	Boys	Girls	Both Sexes
18 to 23.9	97	95	192
24 to 29.9	110	122	232
30 to 35.9	92	104	196
18 to 35.9	299	321	620

**TABLE 2 : Stunting (height for age) by Age Group and Sex
Percent below -2.00 SDs**

Age Group (in months)	Boys n = 299	Girls n = 231	Both Sexes n = 620
18 to 23.9 n = 192	41.2% n = 40	29.5% n = 28	35.4% n = 68
24 to 29.9 n = 232	35.5% n = 39	41.8% n = 51	38.8% n = 90
30 to 35.9 n = 196	55.4% n = 51	48.1% n = 50	51.5% n = 101
18 to 35.9 n = 620	43.5% n = 130	40.2% n = 129	41.8% n = 259

TABLE 3 : Underweight (weight for age) By Age Group and by Sex
Percent below -2.00 Sds

Age Group (in months)	Boys n = 299	Girls n = 231	Both Sexes n = 620
18 to 23.9 n = 192	37.1% n = 36	23.2% n = 22	30.2% n = 58
24 to 29.9 n = 232	28.2% n = 31	36.1% n = 44	32.5% n = 75
30 to 35.9 n = 196	38.0% n = 35	43.3% n = 45	40.8% n = 80
18 to 35.9 n = 620	34.1% n = 102	34.6% n = 111	34.4% n = 213

TABLE 4 : Wasting (weight for age) by Age Group and Sex
Percent below -2.00 SDs

Age Group (in months)	Boys n = 299	Girls n = 231	Both Sexes n = 620
18 to 23.9 n = 192	5.2% n = 5	4.2% n = 4	4.7% n = 9
24 to 29.9 n = 232	2.7% n = 3	1.6% n = 2	2.2% n = 5
30 to 35.9 n = 196	3.3% n = 3	4.8% n = 5	4.1% n = 8
18 to 35.9 n = 620	3.7% n = 11	3.4% n = 11	3.5% n = 22

**TABLE 5 : Severe Stunting (height for age) by Age Group and Sex
Percent below -3.00 SDs**

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes
18 to 23.9 n = 192	18.6% n = 18	9.5% n = 9	14.1% n = 27
24 to 29.9 n = 232	9.1% n = 10	9.8% n = 12	9.5% n = 22
30 to 35.9 n = 196	19.6% n = 18	15.4% n = 16	17.3% n = 34
18 to 35.9 n = 620	15.4% n = 46	11.5% n = 37	13.4% n = 83

**TABLE 6 : Severe Underweight (weight for age) by Age Group and Sex
Percent below -3.00 SDs**

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes n = 620
18 to 23.9 n = 192	7.2% n = 7	3.2% n = 3	5.2% n = 10
24 to 29.9 n = 231	5.5% n = 6	3.3% n = 4	4.3% n = 10
30 to 35.9 n = 196	3.3% n = 3	8.7% n = 9	6.1% n = 12
18 to 35.9	5.4%	5.0%	5.2%

n = 620	n = 16	n = 10	n = 32
----------------	---------------	---------------	---------------

**TABLE 7 : Severe Wasting (weight for height) by Age Group and Sex
Percent below -3.00 SDs**

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes n = 620
18 to 23.9 n = 192	0.0% n = 0	0.0% n = 0	0.0% n = 0
24 to 29.9 n = 232	0.0% n = 0	0.0% n = 0	0.0% n = 0
30 to 35.9 n = 196	0.0% n = 0	0.0% n = 0	0.0% n = 0
18 to 35.9 n = 620	0.0% n = 0	0.0% n = 0	0.0% n = 0

TABLE 8 : Mean Z-score (height for age) by Age Group and Sex

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes n = 620
18 to 23.9 n = 192	-1.87 CI =-2.12 to -1.61	-1.49 CI =-1.72 to -1.26	-1.68 CI =-1.85 to -1.51
24 to 29.9 n = 232	-1.63 CI =-1.83 to -1.44	-1.71 CI =-1.91 to -1.51	-1.67 CI =-1.81 to -1.53
30 to 35.9 n = 196	-2.05 CI =-2.29 to -1.82	-1.96 CI =-2.18 to -1.75	-2.01 CI =-2.17 to -1.85
18 to 35.9	-1.84	-1.73	-1.78

n = 620	CI =-1.97 to-1.71	CI =-1.85 to -1.60	CI =-1.87 to-1.69
----------------	-------------------	--------------------	-------------------

TABLE 9 : Mean Z-score (weight for age) by Age Group and Sex

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes n = 620
18 to 23.9	-1.60	-1.33	-1.46
n = 192	CI =-1.80 to -1.40	CI =-1.52 to -1.13	CI =-1.60 to -1.32
24 to 29.9	-1.51	-1.58	-1.55
n = 232	CI =-1.80 to -1.40	CI =-1.75 to -1.41	CI =-1.67 to -1.42
30 to 35.9	-1.66	-1.70	-1.68
n = 232	CI =-1.86 to -1.46	CI =-1.89 to-1.51	CI =-1.82 to -1.54
18 to 35.9	-1.59	-1.54	-1.56
n = 620	CI =-1.70 to -1.48	CI =-1.65 to -1.43	CI =-1.64 to -1.49

TABLE 10 : Mean Z-score (height for age) by Age Group and Sex

Age Group (in months)	Boys n = 299	Girls n = 321	Both Sexes n = 620
18 to 23.9	-0.81	-0.71	-0.76
n = 192	CI =-0.96 to -0.65	CI =-0.88 to -0.55	CI =-0.88 to -0.65
24 to 29.9	-0.53	-0.61	-0.58
n = 232	CI = -0.66 to -0.40	CI =-0.75 to -0.48	CI =-0.67 to -0.48
30 to 35.9	-0.56	-0.57	-0.57
n = 196	CI =-0.73 to -0.40	CI =-0.72 to -0.42	CI = -0.68 to -0.46

18 to 35.9	-0.63	-0.63	-0.63
n = 620	CI =-0.72 to -0.54	CI =-0.72 to -0.54	CI =-0.69 to -0.57

Following the tabulation of the 620 questionnaires, the principle results of the survey show that:

- " 41.8% (CI at 95% = 37.9 to 45.8) of the children aged 18 to 36 months illustrate stunting and therefore suffer from a chronic malnutrition and among these children, 13.4% or 83 children are severely stunted,
- " 34.4% (CI at 95% = 30.6 to 38.3) of the 620 children surveyed are underweight, which is severe for 5.2% or 32 children,
- " only 3.5% (CI at 95% = 2.3 to 5.4) of children surveyed are wasted, which represents acute malnutrition, and
- " the mean z-scores for height for age is -1.78 ± 1.15 standard deviations; for weight for age, is -1.56 ± 0.98 standard deviations, and for weight for height is -0.63 ± 0.78 standard deviations.

5. DISCUSSION

The survey's objective was to determine the distribution of anthropometric indices height for age, weight for age, and weight for height in a representative sample of children aged 18 to 36 months of age in the FACS program of the Mono Department.

The goal was to constitute a baseline database against which the impact of program activities could be measured at a later date.

The methodology used to identify children, the techniques for collection information and the type of information collected permitted the survey team to meet their stated objectives.

Our discussion will concern the following aspects:

- the quality of data collected,
- the prevalence of various types of malnutrition observed in the sample,
- the malnutrition rates by sex, and
- the malnutrition rates by age group.

5.1 Quality of Data Collected

In order to guarantee the quality of data collected, care was taken in the following areas: the training of supervisors and surveyors, the sampling method, the supervision of data collection, and in the tabulation and analysis of the data.

The sample frame took into account not only the minimum sample size necessary to obtain a 95% confidence level recommended by WHO for such surveys, but also the sample size necessary for 95% in the analysis by age group and by sex. The percentage of children eliminated from the analysis following the survey due to insufficient data quality was very low (0.4%). The random selection was respected in the selection of communities and in the selection of first locality and the first household per community for the survey. Every reasonable precaution was taken in order to obtain a representative sample.

The training of four and one-half days given to surveyors and supervisors gave the necessary skills and experience necessary to take anthropometric measurements with precision and accuracy. The training included sessions on proper measuring techniques, including the reading and recording of measurements and a standardization test at the end of the training session followed by refresher sessions given to those who needed additional work.

The high level of performance acquired by the surveyors and supervisors can be further appreciated by the following facts:

- " Among the 623 children surveyed, only one was outside the age range, one child had his height mistakenly measured in a standing position,
- " of the recording errors that were found on five questionnaires, the majority concerned the correct filling out of the questionnaire.

The fact that four children were mistakenly measured in recumbent positions while their ages above 24 months of age required them to be measured in standing positions could be considered a source of bias. However, in considering the specific z-scores for height and age and weight for height of these children, we discovered that this would not have a significant influence on the malnutrition rates.

During the survey, the supervision of surveyors was constant with a ratio of one supervisor per team of two surveyors. The data were also verified as they were collected. Nevertheless, given that the children aged 18 to 36 months of age constitute our target group for the survey are often less cooperative and frequently agitated during the measuring, we can not presume that every error was eliminated.

5.2. Prevalence of Different Types of Malnutrition Observed in the Sample

The graphs of the distributions height for age, weight for age, and weight for height illustrate a relatively normal bell curve distribution, one which resembles a Gauss distribution.

In comparing the distributions of our sample with the international NCHS reference, one can note a deviation of the project population towards the left, indicating, as expected, that the project children tend to be more malnourished than that of the reference population. The same results were found among the sample population of the Ouémé Department in 1997. It is a reality that is generally observed to varying degrees among children of developing countries.

As indicated in Tables 8 and 9 on pages 20 and 21, the mean values of the z-scores for height for age (-1.78) and for weight for age (-1.58) are very close to those found in 1997 in the Ouémé Department for the same indices (-1.79) and (-1.52), respectively. These values are equally very close to the cut off points for malnutrition, namely, -2.0 standard deviations. This indicates that stunting and low weight for age reach a large portion of the children in the population.

In fact, the prevalence of stunting observed in this study is 41.8% with a confidence interval at 95% confidence varying from 37.9% to 45.8% (see Table 2, page 17). Following the NCHS/CDS/WHO classification, the prevalence is very high. This Mono prevalence mirrors the prevalence of 40.8% revealed by the CRS survey in the Ouémé Department in 1997. This rate also differs little from the rate obtained for children age 12 to 36 months of age in the Demographic and Health Survey conducted for Benin in 1996 which revealed that the rate varied from 30.6% to 38.4% for the nation.

In the Mono Department, the DHS found a prevalence of 27.8% for stunting in children less than three years of age. The data for the prevalence in children 18 to 36 months of age are unfortunately not available. However, given that prevalence of stunting generally increases with age, the difference between our rates and those of the DHS for the Mono Department could be explained by the fact that our sample did not include children less than 18 months of age.

The prevalence of underweight children in our sample is 34.4% with a confidence interval at 95% confidence varying between 30.6% and 38.8% (see Table 3, page 18). This prevalence is considered very high according to the NCHS/CDC/WHO classification. It is also practically identical to the rate of 30.6% found by the CRS Ouémé Department Anthropometry Survey in 1997 which had a confidence interval from 27.1% to 34.4%.

The DHS revealed that in 1996, the prevalence of underweight children aged 12 to 35 months ranged from 34.4% to 38.4% for the nation, and for the Mono Department, underweight was 26.2% for all children under three years of age. The apparent difference observed between our rate (34.4%) and that of the DHS for the Mono Department (26.2%) could equally be explained by difference in age group, which in our case excluded children less than 18 months of age.

In the sample frame for the Mono Department, chronic malnutrition as evidenced by stunting as well as by underweight are largely similar--approximately one child out of two and one out of three are malnourished. According to a report by the World Bank on poverty in Sub-Saharan Africa, this indicator is closely tied to household income and can be considered a poverty indicator as well as a indicator of nutritional status. The indic. height for age is also an indicator of overall development. Low weight for age is equally high in the Mono Department with one child out of three being underweight.

Wasting on the other hand is not as evident in the population: only 3.5% of children surveyed suffer from wasting with a confidence interval that varies from 2.5% to 5.4%. According to the NCHS/CDC/WHO classification, this prevalence is low and is in accordance with the infant mortality rate, which is currently decreasing in Benin. It is currently 104 per 1,000 live births, whereas 20 years ago, it was 135 per 1,000 live births.

The prevalence of wasting found in the project area of the Ouémé Department was 4.4% with a confidence interval of 2.5% to 5.4%. The DHS reported that wasting was prevalent in among children 12 to 35 months of age from 10.5% to 19.1% for the nation and was 10.1% for children less than 3 years of age in the Mono Department.

The discordance between the different rates found could be explained by the fact that each of the surveys took place at different times of the year. Our survey took place in a post harvest period when there is better availability of food at the household level. Moreover, the indic. weight for height is highly sensitive to recent variations in nutritional and energy intake, much more so than the index weight for age. This could equally explain the large difference between wasting (3.5%) found in our survey and that of the DHS (10.1% for children less than three years of age).

The DHS was carried out in Benin from June to August 1997, an interval of time which coincides in large part with the hungry season. The rates observed in our survey for the three types of malnutrition are higher than the rates observed in the reference population, which are 2.3% regardless of the type of malnutrition.

5.3 Malnutrition Rates by Sex

Like the CRS anthropometry survey in the Ouémé Department in 1997, we have observed a significant difference between boys and girls for mean z-scores for height for age ($F=1.47$, $p=0.23$) and weight for age ($F=0.4$, $p=0.53$). No large difference was observed between girls and boys for weight for height. We have not observed a significant difference between the sexes for stunting ($\chi^2 = 0.55$, $p = 0.40$) or for low weight for age ($\chi^2 = 0.02$, $p = 0.89$). The DHS did not identify a significant difference between the two sexes with regard to the different types of malnutrition for children under 3 years of age.

5.4. Malnutrition Rates by Age Group

In the three age groups of our sample, stunting increases with age in both boys and girls, with the exception of the boys aged 24 to 29.9 months). Far from indicating a higher rate of malnutrition by age, it indicates the cumulative effect of malnutrition over time. The same tendency can be observed in the evolution of low weight for height over time.

The differences observed in the age groups are statistically significant ($\chi^2 = 11.71$ et $p = 0.002$) and the age group the most exposed are the 24 to 30 month and the 30 to 36 months old. The differences observed among the underweight are not, however, statistically significant ($\chi^2 = 5.52$, $p = 0.06$) and the same is true for wasting ($\chi^2 = 2.21$, $p = 0.33$).

The anthropometry survey of the Ouémé Department, on the other hand, revealed that the group of children aged 18 to 24 months had the highest level of wasting at 7.0% ($\chi^2 = 3.8$ et $p = 0.05$), but the value of p was very small ($p = 0.05$ is threshold for determining statistical significance).

5.5. Comments on the Nutritional and Health Status of the Children

The tabulation of the various comments made by the surveyors and the supervisors revealed that two children presented signs of kwashiorkor and that five illustrated signs of retarded development of motor skills (delayed walking and language skills).

The different rates of malnutrition are practically the same for the two departments surveyed by CRS despite the fact that they were conducted in during different seasons.

6. CONCLUSION

As in the Ouémé Department, malnutrition expressed as stunting and underweight have taken on the dimensions of a public health problem in the Mono Department in the communities where the CRS Food Assisted Program is being implemented. The principle problem in this department is that of chronic malnutrition for which the prevalence is 41.1% among children aged 18 to 36 months of age.

The observed prevalence of stunting, low weight for height, and wasting remain much higher than those of the reference population. However, these rates mirror those found by the 1996 DHS, with the exception of wasting for which our prevalence rate is significantly less than the rate reported for children under three in the Mono Department DHS.

7. BIBLIOGRAPHY

1. 1998. Catholic Relief Services - Program Quality and Support Department, "Draft CRS Anthropometric Survey Manual," CRS, Baltimore, MD.
2. 1997. Kodjogbé Nicaise, Gora Mboup, Justin Tossou, Léopoldine de Souza, Timothée Gandaho, Alphonse Guèdèmè, Thomas Houèdokoho, Rafatou Houndékon, Thomas Tohouègnon, Suzanne Zomahoun, Virgile Capo-Chichi, André Cossi. Bénin : Enquête Démographique et de Santé 1996, Ministère du Plan, de la Restructuration Economique et de la Promotion de l'Emploi; Institut National de la Statistique et de l'Analyse Economique, Demographic and Health Surveys, Macro International Inc. Claverton, Maryland, USA.
3. 1997. Dean, Andrew G., Epi-Info Version 6 : Guide de l'utilisateur. Editions Ecole de la Santé Publique, Rennes.
4. 1997. Catholic Relief Services/Bénin/MSPSCF/IRSP, Rapport de base.- Enquête anthropométrique sur l'état nutritionnel des enfants de 18 à 36 mois dans le département de l'Ouémé (zone rurale).
5. 1997. World Bank, "Status Report on Poverty in Sub-Saharan Africa, 1997, Tracking the Incidence and Characteristics of Poverty," Draft SPA study, World Bank: Washington, DC.
6. 1995. Catholic Relief Services/Benin, Detailed Program Plan (DPP) 1996-2000, CRS/Bénin, Cotonou, Bénin.
7. 1994. Ministère du Plan, de la Restructuration Economique et de la Promotion de l'Emploi ; Institut National de la Statistique et de l'Analyse Economique, Bureau Central du Recensement, Deuxième Recensement Général de la Population et de l'Habitation, Février 1992 : La population de l'Ouémé : INSAE, Cotonou.
8. 1989. UNICEF, UNESCO & WHO. Savoir pour Sauver - Un défi en matière de communication. UNICEF, New York NY.
9. 1989. WHO, Diarrheal Disease Control Programme, Household Survey Manual: Diarrhoea Case Management, Morbidity, and Mortality. World Health Organization, Geneva.
10. 1988. WHO, Expanded Programme on Immunization, Training for Mid-Level Managers: Coverage Survey. World Health Organization, Geneva.

11. 1988. Nations Unies : Département de la Coopération Technique pour le Développement et Bureau de Statistique, Comment déterminer le poids et les mensurations des enfants : évaluation de l'état nutritionnel des jeunes enfants par voie d'enquêtes auprès des ménages, Nations Unies, New-York.
12. Mesures des modifications de l'état nutritionnel. Guide pour la mesure de l'impact nutritionnel des programmes d'alimentation complémentaire visant les groupes vulnérables. p. 50 à 58.
12. 1982. Henderson, R.H. & Sundaresan, T. "Cluster Sampling to Assess Immunization Coverage: A Review of Experience with a Simplified Sampling Method," Bulletin de l'Organisation Mondiale de la Santé. 60 (2): pp. 253-260.

8. ANNEXES

<table border="1"><tr><td>Annexe A</td></tr><tr><td>QUESTIONNAIRE</td></tr></table>	Annexe A	QUESTIONNAIRE
Annexe A		
QUESTIONNAIRE		

Annexe B
AGE ESTIMATION AND STATURE DETERMINATION (MEASURING POSITION) FORMS

Annexe D STANDARDISATION TEST RESULTS
--

1.- PRECISION ET EXACTITUDE POUR PRISE DU POIDS (GOUPE A)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,04	4/4			<p>Ⓟ Précision optimale # 0,04</p> <p>Ⓟ Précision acceptable = $(0,04 \times 2) = 0,08$</p> <p>Ⓟ Exactitude acceptable = $(0,04 \times 3 = 0,12$</p>
Enq 1	0,14	5/6	0,14	1/5	Ⓟ Précision et exactitude quasi satisfaisantes
Enq 2	0,68	7/9	1,98	10/10	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Mesures à reprendre sans contrôle du superviseur</p>
Enq 3	0,2	8/9	0,06	4/6	<p>Ⓟ Exactitude satisfaisante</p> <p>Ⓟ Précision insuffisante</p> <p>Ⓟ Doit soigner la technique de pesée</p>
Enq 4	0,11	3/3	0,14	6/7	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Doit soigner la technique de pesée</p>
Enq 5	0,09	2/3	1,01	4/7	<p>Ⓟ Précision quasi satisfaisante</p> <p>Ⓟ Exactitude insuffisante</p>
Enq 6	0,32	7/7	0,19	4/7	Ⓟ Précision et exactitude insuffisantes
Enq 7	0,16	8/10	0,53	4/7	Ⓟ Précision et exactitude insuffisantes
Enq 8	0,14	8/8	0,16	5/7	<p>Ⓟ Exactitude quasi satisfaisante</p> <p>Ⓟ Précision insuffisante</p>
Enq 9	10,5	5/9	0,56	9/10	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Présence d'erreur systématique dans la prise des mesures</p> <p>Ⓟ Mesures à reprendre sans la supervision du contrôleur</p>
Enq 10	0,81	6/8	0,51	7/8	<p>Ⓟ Exactitude satisfaisante</p> <p>Ⓟ Précision insuffisante</p>

2.- PRECISION ET EXACTITUDE POUR PRISE DU POIDS (GOUPE B)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,51	2/3			<p>Ⓟ Précision optimale # 0,51</p> <p>Ⓟ Précision acceptable = $(0,51 \times 2) = 1,02$</p> <p>Ⓟ Exactitude acceptable = $(0,51 \times 3 = 1,53$</p>
Enq 1	0,08	4/5	0,95	8/9	<p>Ⓟ Précision et exactitude satisfaisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 2	0,34	4/7	2,15	8/10	<p>Ⓟ Précision satisfaisante</p> <p>Ⓟ Exactitude insuffisante</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 3	0,05	3/5	4,86	5/7	<p>Ⓟ Précision satisfaisante</p> <p>Ⓟ Exactitude insuffisante</p> <p>Ⓟ Doit faire beaucoup attention</p>
Enq 4	0,09	3/6	1,52	3/6	Ⓟ Précision et exactitude satisfaisantes
Enq 5	0,36	5/6	0,92	5/7	Ⓟ Précision et exactitude satisfaisantes
Enq 6	0,76	3/4	1,53	6/8	Ⓟ Précision et exactitude satisfaisantes
Enq 7	0,10	4/7	0,89	4/6	Ⓟ Précision et exactitude satisfaisantes
Enq 8	0,08	3/5	0,89	3/6	Ⓟ Précision et exactitude satisfaisantes
Enq 9	0,10	6/7	0,97	5/7	Ⓟ Précision et exactitude satisfaisantes
Enq 10	0,34	2/2	0,29	3/5	Ⓟ Précision et exactitude satisfaisantes

3.- PRECISION ET EXACTITUDE POUR PRISE DU POIDS (GOUPE C)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,01	1/1			<p>Ⓟ Précision optimale # 0,01</p> <p>Ⓟ Précision acceptable = $(0,01 \times 2) = 0,02$</p> <p>Ⓟ Exactitude acceptable = $(0,01 \times 3) = 0,03$</p>
Enq 1	3,3	4/7	0,8	5/8	Ⓟ Précision et exactitude insuffisantes
Enq 2	0,10	7/7	0,39	9/10	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 3	4,04	5/6	8,81	7/9	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 4	0,39	4/4	0,24	4/6	Ⓟ Précision et exactitude insuffisantes
Enq 5	0,13	5/7	0,22	6/8	Ⓟ Précision et exactitude insuffisantes
Enq 6	0,55	7/7	0,20	7/9	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 7	0,96	3/4	0,13	4/4	Ⓟ Précision et exactitude insuffisantes
Enq 8	0,10	5/7	0,43	7/9	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p> <p>Ⓟ Reprendre les mesures sans contrôle du superviseur</p>
Enq 9	4,3	6/9	5,61	10/10	<p>Ⓟ Précision et exactitude insuffisantes</p> <p>Ⓟ Erreur systématique dans la prise des mesures</p>
Enq 10	0,08	3/5	0,21	4/5	<p>Ⓟ Précision satisfaisante</p> <p>Ⓟ Exactitude insuffisante</p>

4.- PRECISION ET EXACTITUDE POUR PRISE DE LA TAILLE (GOUPE A)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,96	7/7	ND	ND	<p>P Précision optimale # 0,96</p> <p>P Précision acceptable = $(0,96 \times 2) = 1,92$</p> <p>P Exactitude acceptable = $(0,96 \times 3) = 2,88$</p>
Enq 1	2,94	4/8	7,41	10/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Reprendre les mêmes sur les enfants sans la surveillance du contrôleur</p>
Enq 2	1,57	6/8	2,55	8/9	P Précision et exactitude satisfaisantes
Enq 3	2,15	8/9	1,28	10/10	<p>P Exactitude satisfaisante</p> <p>P Précision insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Reprendre les mesures sur les mêmes enfants sans contrôle du superviseur</p>
Enq 4	1,33	6/9	8,08	10/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Reprendre les mesures sur les mêmes enfants sans contrôle du superviseur</p>
Enq 5	1,33	5/9	6,57	9/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 6	3,18	5/10	19,11	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 7	3,98	5/9	53,06	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 8	3,5	5/9	57,49	9/9	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 9	123,02	5/5	109,42	8/10	<p>P Précision et exactitude insuffisantes</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 10	5,67	5/9	51,27	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p>

					P Mesures à reprendre sans contrôle du superviseur
--	--	--	--	--	---

5.- PRECISION ET EXACTITUDE POUR PRISE DE LA TAILLE (GOUPE B)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,44	6/8			<p>P Précision optimale # 0,44</p> <p>P Précision acceptable = $(0,44 \times 2) = 0,88$</p> <p>P Exactitude acceptable = $(0,44 \times 3 = 1,32$</p>
Enq 1	1,73	5/9	8,03	7/10	<p>P Précision et exactitude insuffisantes</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 2	1,42	7/10	8,8	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 3	0,46	6/8	13,06	9/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 4	1,41	6/10	5,21	7/9	<p>P Précision et exactitude insuffisantes</p> <p>P Doit beaucoup soigner la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 5	5,86	7/10	23,95	9/9	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 6	4,23	5/8	22,63	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 7	2,93	5/9	13,84	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 8	0,77	5/8	29,02	9/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 9	47,43	4/8	60,05	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Doit beaucoup faire attention et reprendre les mesures sans contrôle du superviseur</p>
Enq 10	1,76	6/10	19,98	9/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>

6.- PRECISION ET EXACTITUDE POUR PRISE DE LA TAILLE (GOUPE C)

	Précision		Exactitude		Observations
	Totaux	Signe	Totaux	Signe	
Shorr	0,67	8/10			<p>P Précision optimale # 0,67</p> <p>P Précision acceptable = $(0,67 \times 2) = 1,34$</p> <p>P Exactitude acceptable = $(0,67 \times 3) = 2,01$</p>
Enq 1	161,98	5/10	135,73	8/10	<p>P Précision et exactitude très insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Doit beaucoup faire attention et reprendre les mesures sans contrôle du superviseur</p>
Enq 2	1,2	8/10	5,45	9/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Reprendre les mesures sans contrôle du superviseur</p>
Enq 3	131,84	6/10	141,99	6/10	<p>P Précision et exactitude très insuffisantes</p> <p>P Doit beaucoup faire attention et reprendre les mesures sans contrôle du superviseur</p>
Enq 4	1,2	6/10	2,29	4/8	P Précision et exactitude pratiquement satisfaisantes
Enq 5	0,97	6/10	10,76	8/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 6	2,14	5/9	35,67	10/10	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 7	1,13	4/8	2,14	5/10	P Précision et exactitude quasi satisfaisantes
Enq 8	2,69	5/9	8,47	8/9	<p>P Précision et exactitude insuffisantes</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>
Enq 9	2,54	5/8	21	5/10	<p>P Précision et exactitude insuffisantes</p> <p>P Doit beaucoup faire attention et reprendre les mesures sans contrôle du superviseur</p>
Enq 10	1,56	4/7	15,61	9/10	<p>P Précision satisfaisante</p> <p>P Exactitude insuffisante</p> <p>P Erreur systématique dans la prise des mesures</p> <p>P Mesures à reprendre sans contrôle du superviseur</p>